

What is claimed:

1. A method of operating a spread spectrum radio signal receiver having at least first and second signal tracking channels to increase the interference discrimination between first and second received signals broadcast on the same carrier frequency band and modulated by first and second codes, respectively, the codes each having a known number of code phases, comprising the steps of:

- (a) receiving a first compound signal comprising the first and second received signals;
- (b) operating the first channel to track the first received signal and measure its amplitude, code phase, and received frequency;
- (c) selecting the received frequency and code phase of the second received signal;
- (d) operating the second channel at the selected code phase and received frequency of the second received signal to receive a second compound signal comprising the first and second signals;
- (e) computing the predicted code and frequency domain crosscorrelation of the first received signal with the second received signal;
- (f) multiplying the amplitude of the first received signal with the predicted crosscorrelation to compute the interference between the first and second received signals; and
- (g) subtracting the interference from the second compound signal to extract the second received signal including at least one of its received frequency, amplitude, and code phase.

2. The method of claim 1, comprising the further steps of:

within step (c), performing the further steps of:

selecting a range of received frequencies and code phases for the second received signal;

5 selecting an initial second code phase and received frequency within the respective selected range; and

selecting a code phase incremental value and a received frequency incremental value;

10 performing steps (d) - (f) for the initial second code phase and initial received frequency of the second received signal;

performing step (g) to extract the amplitude of the second received signal;

repeating steps (d) - (g) for all second code phases and received frequency values within the respective range that are offset from the respective initial values by an integer multiple of the code phase incremental value and received frequency incremental value, respectively; and

15 selecting the second received signal code phase and received frequency at which the extracted second received signal has the largest amplitude for tracking in the second channel.

3. The method of claim 2, comprising the further steps of:

within step (c), performing the further step of:

selecting a frequency domain crosscorrelation threshold value;

within step (e), comparing the frequency domain crosscorrelation with

the threshold value; and

if the crosscorrelation is greater than the threshold value, proceeding directly to perform step (d) for a different value of the second received signal received frequency.

4. The method of claim 3, wherein the crosscorrelation threshold value is about 10 dB.

5. A method of operating a spread spectrum radio signal receiver having at least first and second signal tracking channels to increase the interference discrimination between first and second received signals broadcast on the same carrier frequency band and modulated by first and second codes, respectively, the codes each having a known number of code phases, comprising the steps of:

(a) receiving a first compound signal comprising the first and second received signals;

(b) operating the first channel to track the first received signal and measure its amplitude;

(c) predicting the first code phase and received frequency of the first received signal;

(d) selecting the second code phase and received frequency of the second received signal;

(e) operating the second channel at the selected code phase and received frequency of the second received signal to receive a second compound signal comprising the first and second received signals;

- (f) computing the predicted code and frequency domain crosscorrelation of the first received signal with the second received signal;
- (g) multiplying the amplitude of the first received signal with the predicted crosscorrelation to compute the interference between the first and second received signals; and
- (h) subtracting the interference from the second compound signal to extract the second received signal including at least one of its received frequency, amplitude, and code phase.

6. The method of claim 5, comprising the further steps of:

within step (d), performing the further steps of:

selecting a range of received frequencies and code phases for the second received signal;

selecting an initial second code phase and received frequency within the respective selected range; and

selecting a code phase incremental value and a received frequency incremental value;

performing steps (e) - (g) for the initial code phase and initial received frequency of the second received signal;

performing step (h) to extract the amplitude of the second received signal;

repeating steps (e) - (h) for all second code phases and received frequency values within the respective range that are offset from the respective initial values by an integer multiple of the code phase incremental value and received frequency incremental value, respectively; and

selecting the second received signal code phase and received frequency at which the extracted second received signal has the largest amplitude for tracking in the second channel.

7. The method of claim 6, comprising the further steps of:
within step (d), performing the further step of:

selecting a frequency domain crosscorrelation threshold value;

within step (f), comparing the frequency domain crosscorrelation with
the threshold value; and

if the crosscorrelation is greater than the threshold value, proceeding directly to perform step (e) for a different value of the second received signal received frequency.

8. The method of claim 7, wherein the crosscorrelation threshold value is about 10 dB.

9. A method of operating a spread spectrum radio signal receiver having at least one signal tracking channel to increase the interference discrimination between first and second received signals broadcast on the same carrier frequency band and modulated by first and second codes, respectively, the codes each having a known number of code phases, comprising the steps of:

(a) acquiring the amplitude, code phase, and received frequency of the first received signal;

- (b) selecting the received frequency and code phase of the second received signal;
- 10 (c) operating the tracking channel at the selected code phase and received frequency of the second received signal to receive a compound signal comprising the first and second received signals;
- (d) computing the predicted code and frequency domain crosscorrelation of the first signal with the second received signal;
- 15 (e) multiplying the amplitude of the first signal with the predicted crosscorrelation to compute the interference between the first signal and the second received signal; and
- (f) subtracting the interference from the compound signal to extract the second received signal including its code phase, received frequency,
- 20 and amplitude.

10. The method of claim 9, wherein the receiver includes an additional signal tracking channel, and comprising within step (a) the further steps of:

receiving in the additional channel an additional compound signal comprising the first received signal; and

5 operating the additional channel to track the first received signal and measure its amplitude, code phase, and received frequency.

11. The method of claim 10, comprising the further steps of:

within step (b), performing the further steps of:

selecting a range of received frequencies and code phases for the

second received signal;

5 selecting an initial second code phase and received frequency within the respective selected range; and

selecting a code phase incremental value and a received frequency incremental value;

10 performing steps (c) - (e) for the initial code phase and initial received frequency of the second received signal;

performing step (f) to extract the amplitude of the second received signal;

repeating steps (c) - (f) for all second code phases and received frequency values within the respective range that are offset from the respective initial values by an integer multiple of the code phase incremental value and received frequency incremental value, respectively; and

15 selecting the second received signal code phase and received frequency at which the extracted second received signal has the largest amplitude for tracking in the second channel.

12. The method of claim 11, comprising the further steps of:

within step (b), performing the further step of:

selecting a frequency domain crosscorrelation threshold value;

5 within step (d), comparing the frequency domain crosscorrelation with the threshold value; and

if the crosscorrelation is greater than the threshold value, proceeding directly to perform step (c) for a different value of the second received signal received frequency.

13. The method of claim 12, wherein the crosscorrelation threshold value is about 10 dB.

14. The method of claim 9, wherein the receiver includes an additional signal tracking channel, and comprising within step (a) the further steps of :

receiving in the additional channel an additional compound signal comprising the first received signal;

5 operating the additional channel to track the first received signal and measure its amplitude; and

predicting the code phase and received frequency of the first received signal.

15. The method of claim 14, comprising the further steps of:

within step (b), performing the further steps of:

selecting a range of received frequencies and code phases for the second received signal;

5 selecting an initial second code phase and received frequency within the respective selected range; and

selecting a code phase incremental value and a received frequency incremental value;

10 performing steps (c) - (e) for the initial code phase and initial received frequency of the second received signal;

performing step (f) to extract the amplitude of the second received signal;

repeating steps (c) - (f) for all second code phases and received frequency

values within the respective range that are offset from the respective initial values by an integer multiple of the code phase incremental value and received frequency incremental value, respectively; and
selecting the second received signal code phase and received frequency at which the extracted second received signal has the largest amplitude for tracking in the second channel.

16. The method of claim 15, comprising the further steps of:
within step (b), performing the further step of:

selecting a frequency domain crosscorrelation threshold value;
within step (d), comparing the frequency domain crosscorrelation with
the threshold value; and

if the crosscorrelation is greater than the threshold value, proceeding directly to perform step (c) for a different value of the second received signal received frequency.

17. The method of claim 16, wherein the crosscorrelation threshold value is about 10 dB.